Art. XVII.—*Stylasteridæ from the Victorian Tertiaries.*

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In a previous volume of the Proceedings I noted the presence of Stylasteridæ in our tertiaries, and described two new genera and species.[1] One of these *Leptobothrus spenceri*, as pointed out by the late Dr. P. H. Macgillivray,[2] proves to be a polyzoon, *Porina gracilis*. Of the other form, numerous examples have now occurred to me, and are dealt with below. The presence of two other genera, *Distichopora* and *Sporadopora* is noted, the latter being represented by what appears to be the recent species *S. dichotoma*.

Deontopora, T. S. Hall.

This genus was founded on a single well preserved specimen.[3] Since then several other examples from our Eocene beds have come under my notice, and I obtained a very large number from the Miocene sands of the Grange Burn near Hamilton. An examination of these specimens throws some additional light on the structure of the corallum and on the affinities of the genus.

In the younger parts of the branches the cyclosystems are arranged in such a way that a zigzag form is produced, but this feature soon disappears with advancing age. The terminal cyclosystem of a branch, from which the succeeding systems are produced, has the dactylopores arranged in a complete ring round the gastropore, and the same character may be found in one, or perhaps two, of the next older systems. As growth proceeds,

1 Proc. Roy. Soc. Vict., v., N.S., 1893, p. 117.
2 Trans. Roy. Soc. Vict., iv., 1895, p. 103.
3 Proc. Roy. Soc. Vict., v., N.S., 1893, p. 117.

however, the dactylopores on the inner side of the system always disappear, and at a still later date the systems may be seen to be almost entirely obliterated. The gastropores are provided with styles, which are short and stout, and in the dactylopores a style is represented by a toothed plate on the outer wall. Within the gastropore, about the level of the top of the style, is a ring of projecting teeth, which thus divide the chamber into two portions an inner and an outer. In some of the specimens, ampullæ are very numerous. In one example for instance there was a row of five confluent ones on one face and four on the opposite face, while in another instance there were several, perhaps half a dozen, so massed together that they could not be clearly separated. The outer walls of the ampullæ are very thin and liable to be broken down. In the unbroken ones there is to be seen, in some cases, a fairly definite opening leading into the interior. The edges of these openings are rounded off so that they do not appear to be due to fractures. They occupy the places, in some cases at any rate, of the slit-like pores of the external surface and from which they are probably developed. Reference was made to this character in the previous paper and it was inferred that the definite nature of the opening implied a constant succession of escaping planulæ. The inner basal wall of the ampulla generally shows a large pore about its centre.

In some well preserved specimens the cord-like ridges of the surface were seen to be crossed by fine ridges or striæ.

Anastomosis of two branches was noted in one instance, while in some others the corallum had almost entirely wrapped round a stem of *Isis*, which it crossed diagonally.

A series of measurements of *Deontopora* was made and compared with a corresponding series of *Stylaster* sp., which show that the cyclosystems and pores of the fossil are considerably larger than those of the recent form.

The diameters are as follows, the figures being millimeters.

	Cyclosystem.	Gastropore.	Dactylopore.
Deontopora - -	1·0 to 0·8 ...	0·5 to 0·2 ...	0·14 to 0·07
Stylaster - -	0·6 to 0·5 ...	0·3 to 0·2 ...	0·07 to 0·05

In the original description the affinities of the genus were left undecided. It will be seen that the relationship to *Stylaster* is

very close, but the characteristic feature on which the genus was founded, namely the absence of dactylopores from the inner side of the cyclosystem, is so constant, except in the tips of the growing branches, that the retention of the genus appears advisable.

Localities. Eocene: Orphanage Hill, Fyansford; Filter Quarries, Batesford; Cape Otway; Clifton Bank, Muddy Creek. *Miocene*: Grange Burn (Forsyth's), near Hamilton.

Genus Sporadopora, Moseley

Sporadopora dichotoma. Moseley.[1]

The fossil specimens do not seem separable from the recent species described by Moseley.

The specimens consist of fragments up to about an inch and a half in length. The stouter pieces are cylindrical and about as thick as one's little finger, while those from nearer the distal end are elongate oval in transverse section and give out flattened lobes, just as shown in Moseley's figure.[2] The surface of the corallum is marked by short almost vermiculate lines which are merely the outer extremities of the irregular branching, and anastomosing calcareous bars, of which the whole corallum is built up. The structure is denser nearer to the surface than in the axial portions as shown both in thin sections and in the broken ends of the branches. Piercing the outer wall are a great number of circular pores varying greatly in size, and scattered irregularly over the surface. The gastropores, as also the dactylopores, are of several sizes, and viewed externally are, as a rule, choked with the clayey matrix in which they were found. Frequently the gastropores are plugged with a grain of siliceous sand, which is at times disastrous when a slice is being ground down. The varying size of the gastropores is not mentioned by Moseley in the text but is shown clearly in one of his figures.[3] It is rather difficult to arrive at any exact proportion of the number of gastropores to that of dactylopores, as the latter, being smaller, are more hidden by the matrix, which even several boilings in

1 Phil. Trans., 1878, p. 429.
2 *Loc. cit.*, pl. 34, fig. 1.
3 *Loc. cit.*, pl. 35., fig. 2.

carbonate of soda has failed to remove. The broken ends of the better preserved specimens show the gastropore styles with great clearness. As a rule the specimens are not infiltrated by any foreign matter, excepting close to the outside, so that the delicate tubulæ and complicated styles can be seen as clearly as in a recent specimen. The gastropores can be seen to open at right angles to the general surface of the corallum and the canal then to curve down towards the proximal end, running parallel to the axis.

The general appearance agrees exactly with the figure of the section given by Moseley, but I have not seen any ampullæ. The dactylopores are not so constant in their course as the gastropores, but seem to rapidly disappear in the ground meshwork. The perforations in the pore-walls are plainly visible.

Some of the larger portions are bored by some organism, which, finding the axial part less dense, has occupied this part of the corallum. Some of these tubes have a thin calcareous wall of their own. After a prolonged examination I have been unable to detect any criteria which would separate the present fossils from the forms described by Moseley. The "Challenger" specimens were dredged off the mouth of the Rio de la Plata in 600 fathoms.

Locality. The present specimens I gathered in the Miocene clays of the Grange Burn, Section II^{b}, Allotment I., Parish of South Hamilton.

This genus, as represented by a new species *S. marginata*, T. Wds., is recorded by Tenison Woods from the Eocene of the Chatham Islands.[1]

Distichopora, Lamarck.

The careful way in which the morphology of this genus was worked out by Moseley[2] leaves very little to be desired. With regard to the specific characters that distinguish the different members of the group considerable difficulty arises. Tenison Woods[3] gives a detailed account of five species known to him from the Pacific. More recently Professor Sydney J. Hickson, dealing with a collection made in Torres Strait by Professor A. C. Haddon[4] arrives at the conclusion that the characters hitherto

1 Palæontology of New Zealand, pt. iv., 1880, p. 22.
2 *Loc. cit.*
3 Journal Roy. Soc. New South Wales, 1879.
4 Scientific Proc. Roy. Dublin Soc., vii., N.S., pt. v.

relied on in the main as specific are not so in reality. He is inclined to believe that the colour variation is merely an indication of sex and age, and says "In all cases it is difficult to determine specific differences in Hydrocorallines; but the difficulty is considerably increased when there are only small pieces of the coralla at the disposal of the naturalist, for the general form, colour and mode of branching of the entire colony have always been taken as some of the most important specific characters of these corals, and these features cannot be determined by the examination of small pieces. Whether these characters are satisfactory is another matter." These difficulties press the more heavily upon the palæontologist, as he has usually to deal with very small fragments.

Numerous fragments of the genus have occurred to me from both our Miocene and Eocene beds, but I leave their specific determination undecided. A series of measurements of the diameters of the pores showed that the range of variation was so great that satisfactory results could not be attained in this way. Comparison was made with a recent specimen of *D. coccinea*, Gray. The pores as a rule were larger in the fossil than in the recent form. In many of the specimens, which were somewhat rolled and corroded, the thinner tissue near the mouth of the pores had broken down so that the gastropores appeared to open into a longitudinal sulcus while the dactylopores occupied grooves leading into this and also trenching the outer wall of the corallum. For some time I thought that this might serve as a specific difference, but as most of the specimens showing it seemed to be worn, and were moreover small and presumably young branches, whereas the characters did not appear in thicker specimens, stress cannot be laid upon it. Still I think it very probable that better specimens will show that the peculiarity of the dactylopores opening into grooves does normally occur in our Eocene species. Till specific differences are found in the corallum of the recent species which are decipherable even in fragments, we must, I think, rest content with a generic record from our tertiary beds.

Localities.—Miocene: Grange Burn, near Hamilton; *Eocene*: Muddy Creek; Batesford.